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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/530,180
Filing Date: April 04, 2005
Appellant(s): NAGAYA, GO

Diallo Crenshaw
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 27, 2010 appealing from the Office action mailed Dec. 30, 2009.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 1-6

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

1,780,370	TENNEY	11-1930
2,635,704	HERRESHOFF	4-1953
3,468,389	NELSON	9-1969
4,472,331	BAKER et al.	10-1969
3,818,721	WAHLMARK	6-1974
4,504,099	MIKI et al.	3-1985
4,541,819	MAZZIOTTI	9-1985
5,224,563	IIZUKA et al.	7-1993
5,791,995	KUDO et al.	8-1998

Examiner comment on the identification of Evidence Relied Upon: The examiner notes that the reference to TENNEY was mis-identified in the office action of Dec. 30, 2009 as U.S. Patent 1,780,870, and apologizes for any confusion resulting there-from. The correct patent number (1,780,370) is provided above, and was provided telephonically to Appellant. Appellant has submitted a written request for clarification filed Feb. 12, 2010, however this request was not forwarded to the examiner before Appellant's Brief. In that Appellant acknowledges the correct patent number in the Brief (footnote '1', page 7) and has elected to proceed with the Appeal by submitting a Brief, it is understood that Appellant desires to proceed with the Appeal.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:
Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. in view of Iizuka et al..

Baker et al. teach an arrangement for the driving of a steerable wheel (42) including a first knuckle (proximate 122) which does not turn and is locked in a steering direction (e.g., at least through the connection at 124, 132, 134), and which is connected to an upper suspension arm (22), a lower suspension arm (24) and to a non-rotating vehicle portion and which supports, in a non-steered configuration, a drive assembly (12, 16), a second knuckle (19, 21, 82, 85) which is steerable, pivotally mounted with respect to the first knuckle about a king pin axis (Y), the arrangement additionally fitted with a braking arrangement (56, 58), wherein drive force is provided to the wheel hub through a mechanical arrangement including a flexible constant velocity joint (26) having a center (C) along the king pin axis (Y) and including two direct moving portions (e.g., 20 and 28) connected to one another by a pair of joint portions (orthogonal to one another) such that the axes of movement intersect at the center (C). The reference to Baker et al. fails to teach the drive source as comprising a motor. Iizuka et al. teach that it is well known to provide the steerable wheels of a vehicle (23, see top of figure 5) with drive motors. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a motor drive as taught by Iizuka et al. for driving the wheels of the vehicle taught by Baker et al. with the non-moving portion of the motor connected to the non-steered portion of the vehicle frame (as also suggested by Iizuka et al.), for the purpose of reducing or eliminating emissions in city driving scenarios.

As regards the provision of a steering rod for rotating the steerable portions with respect to the non-steerable portions, in that (a) Baker et al. teach an arrangement for a steerable wheel and (b) it is very well known in the vehicle arts to connect a steering rod to a pivoting wheel support to allow the wheel to be steered, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide a steering rod connected a steerable portion (and as such to the second knuckle portion, as broadly claimed) in order to allow the wheel to be steered.

Note that the modifying reference to Iizuka (see figure 5) teaches the use of a steering linkage (27) which connects to the turnable or steerable portions of the wheel mounts (e.g., outboard of the universal joints 26).

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. in view of Iizuka et al. and Tenney.

Baker et al. teach an arrangement for the driving of a steerable wheel (42) including a first knuckle (proximate 122) which does not turn and is locked in a steering direction (e.g., at least through the connection at 124, 132, 134), and which is connected to an upper suspension arm (22), a lower suspension arm (24) and to a non-rotating vehicle portion and which supports, in a non-steered configuration, a drive assembly (12, 16), a second knuckle (19, 21, 82, 85) which is steerable, pivotally mounted with respect to the first knuckle about a king pin axis (Y), the arrangement additionally fitted with a braking arrangement (56, 58), wherein drive force is provided to the wheel hub through a mechanical arrangement including a flexible constant velocity joint (26) having a center (C) along the king pin axis (Y) and including two direct moving portions (e.g., 20 and 28) connected to one another by a pair of joint portions (orthogonal to one another) such that the axes of movement intersect at the center (C). The reference to Baker et al. fails to teach the drive source as comprising a motor. Iizuka et al. teach that it is well known to provide the steerable wheels of a vehicle (23, see top of figure 5) with drive motors. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide a motor drive as taught by Iizuka et al. for driving the wheels of the vehicle taught by Baker et al. with the non-moving portion of the motor connected to the non-steered portion of the vehicle frame (as also suggested by Iizuka et al.), for the purpose of reducing or eliminating emissions in city driving scenarios. The combined references to Baker et al, and Iizuka et al., while both explicitly teaching wheel arrangements which are steerable and are driven from a source which does not rotate with the steering, fail to explicitly teach a rod connected to a portion of the knuckle which pivots in a steering direction. Tenney teaches that it is very old and very well known to actuate a steered wheel (43) with a rod (72) which is connected to an arm (40) connected to the pivoting portion of the wheel mount, which pivoting portion is connected with the pivoting portions of at least two knuckle assemblies (26, 28, 30) through at least the portions of the steered wheel assembly connecting the arm 40 with the pivoting portions of the knuckle assemblies. It would have been obvious to one of ordinary skill in the art at the

time of the invention to provide a steering rod as is very old and very well known, to connect the pivoting steered portion of the wheel assembly (and thus the turnable portions of the knuckle arrangements) of the drive of Baker et al. as modified by Iizuka et al. for the very old and well known purpose of ensuring that the wheel can actually be steered. Since both the wheels of Baker et al. and Iizuka et al. are explicitly disclosed as being steerable, and in that the use of a connecting rod is exceptionally old and well known, such a combination beneficially makes use of well known and well established technologies to perform this operation, allowing the invention to be achieved using commonly known and available parts.

Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. in view of Iizuka et al. and Nelson. The references to Baker et al. and Iizuka et al are discussed above and fail to teach the connection of the motor to the non-steered knuckle portion by an elastic body or damper, and 'direct-moving guides' in vertical and horizontal directions. Nelson teaches an old and well known arrangement for mounting a motor in a vehicle drive arrangement, wherein a motor (12) is mounted to non-steered portions of a vehicle (e.g., 62, 67) with plural resilient bushing elements (44, 46) and direct moving guide portions (50) being separately oriented in horizontal (58) and vertical (52) orientations and being provided with further resilient buffer members (36, 36, 37, 37). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the mounting of the motor drive connected to the non-steered vehicle portions (and thus to the non-steered knuckle portion) of the vehicle of Baker et al. as modified by Iizuka et al. with the resilient and direct moving buffer and guide arrangement taught by Nelson, for the purpose of isolating the motor and frame so as to absorb torque reaction of the motor and cushion the motor from shocks and vibrations generated in the drive axle.

As regards claims 5 and 6, while the references to Baker and Iizuka teach universal joints (which may function as constant velocity joints for low angular values between input and output), the references do not explicitly teach the joints to be constant velocity joints. It is well known, however to employ a constant velocity joint in place of a

universal joint for the well known purpose of keeping the incremental input and output velocities as close to one another as possible (rather than only the average velocity summed over a whole rotation as may be had with a universal joint).

Claims 2-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baker et al. in view of Iizuka et al., Tenney and Nelson.

The references to Baker et al., Iizuka et al. and Tenney are discussed above and fail to teach the connection of the motor to the non-steered knuckle portion by an elastic body or damper, and 'direct-moving guides' in vertical and horizontal directions. Nelson teaches an old and well known arrangement for mounting a motor in a vehicle drive arrangement, wherein a motor (12) is mounted to non-steered portions of a vehicle (e.g., 62, 67) with plural resilient bushing elements (44, 46) and direct moving guide portions (50) being separately oriented in horizontal (58) and vertical (52) orientations and being provided with further resilient buffer members (36, 36, 37, 37). It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the mounting of the motor drive connected to the non-steered vehicle portions (and thus to the non-steered knuckle portion) of the vehicle of Baker et al. as modified by Iizuka et al. and Tenney with the resilient and direct moving buffer and guide arrangement taught by Nelson, for the purpose of isolating the motor and frame so as to absorb torque reaction of the motor and cushion the motor from shocks and vibrations generated in the drive axle.

As regards claims 5 and 6, while the references to Baker et al. Tenney and Iizuka et al. all teach universal joints (which may function as constant velocity joints for low angular values between input and output), the references do not explicitly teach the joints to be constant velocity joints. It is well known, however to employ a constant velocity joint in place of a universal joint for the well known purpose of keeping the incremental input and output velocities as close to one another as possible (rather than only the average velocity summed over a whole rotation as may be had with a universal joint).

Of the patents cited in the "Evidence Relied Upon" section above, the references to Tenney, Nelson, Baker et al. and Iizuka et al. are applied against the claims in the rejections stated above. The references to Herreshoff, Whalmark, Miki et al., Mazziotti, and Kudo et al. have been relied upon as documentary evidence to support assertions by the examiner that certain features are old and well known.

(10) Response to Argument

Initially, the examiner notes that Appellant has argued various changes in rationale and/or position on the part of the examiner throughout the prosecution of the application (see throughout pages 9-13 of the Brief, for example). The examiner notes that as Appellant changes the content of the claims, for example through amendment, that the interpretation and application of prior art against those claims may change. As such, the arguments directed to the claims as they are currently written and the rejections as they currently are presented are being treated herein.

As regards the reference to Baker et al., the examiner has identified the first knuckle as being a portion which does not turn, and which, due to not turning, would reasonably be understood to not be steerable, as being at least the portion of the mechanism proximate non-turning element 122. Element 22, which supports the non-steered knuckle portion at least through the fastening elements 124, 132, 134, forms an upper suspension arm 22 which is understood firstly to constitute an arm by being attached to the drive portion 12 (and thence to the remainder of the vehicle body, note col. 3, lines 5-12) and extending outwardly from the drive portion, the element (22) being reasonably characterized secondly as an 'upper' element compared, for example, to the opposingly located lower arm 24. These portions, being located on the vehicle side of the pivot axis (shown at 'Y') do not pivot for steering the vehicle since they are non-pivotally attached to the vehicle. Baker et al. further provide a second knuckle element (19, 21, 82, 85) which is steerable with respect to the non-steered portions (col. 4, lines 26-32). Also note that Baker et al. explicitly refer to portion 14, which comprises

upper and lower suspension arms as a 'suspension yoke' (see at least col. 6, line 35), and as such, the arms 22, 24 are reasonably understood to be suspension arms.

As regards the provision of a steering rod, Appellant has asserted that Baker et al. provides no such teaching. The examiner agrees. Baker, et al. is, however, explicitly directed to a wheel assembly which may be steered (see Baker et al. at col. 1, lines 29-32). Further, however, the examiner asserts that providing a steering rod is quite old and quite well known to those of ordinary skill in the automotive arts. To support this assertion, the examiner further noted that the reference to Herreshoff, known since 1953, provides a showing of evidence that one of ordinary skill would well understand that a steering rod (280, 282) can be provided to connect to a turnable part (266, 268, 270, 272) which connects to a turnable knuckle portion (35', 37') which controls steering of a wheel (10, 14). Since Baker et al. is very explicitly directed to a steerable wheel, it is reasonable to suggest that one of ordinary skill in the art would be well versed in providing a mechanism for actually steering the wheel. In that a steering rod would be required to exert a turning force on a portion of the wheel suspension which can pivot for steering, it would be appropriate to connect such a rod to a steered portion of the arrangement, such as steered knuckle portions (19, 21, 82, 85), in that connecting the rod to a portion of the assembly which does not pivot would be well understood to not result in controllable steering.

As regards the combination with the reference to Iizuka et al. Appellant has asserted that the motor taught by Iizuka et al. is not located in the wheel. The examiner notes that this point is not persuasive in light of the claims for at least the following reasons.

First: The only apparent recited relationship of the motor as being connected with respect to the wheel is found in the claim preambles: "an in-wheel motor system [for mounting a direct drive motor to a wheel]". Such a limitation is given little patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the

preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. Further, the functional modifier "for mounting a ... motor to a wheel" is not understood to be equivalent to a recitation of mounting the motor --in-- a wheel. Additional relationships involving the motor are recited in the bodies of claim 2 (lines 1-3), claim 3 (lines 2-3), claim 4 (lines 2-3), claim 5, (lines 2-3) and claim 6 (lines 2-6), but none of these recited relationships refer to the motor as being in the wheel.

Second, as again regards the preamble limitations, even if accorded patentable weight, the preambles recite an "in-wheel motor system" which while clearly indicating that at least some of the system is an "in-wheel" system does not recite that the entire system is contained within the wheel, nor does such a recitation positively locate the motor itself within the wheel.

Third, Appellant's own constructive definition of an "in-wheel motor system" does not require a motor to be located with in a wheel. Appellant has explicitly identified, in section V of the Brief, the "Summary of Claimed Subject Matter", the illustration of figure 1 and the specification text at "page 6, lines 4-18" as being representative of the claimed subject matter. Figure 1 clearly illustrates the motor (element 3) which is described as being part of the asserted in-wheel motor system, as located exteriorly of the wheel (elements 1, 2, 2a, 2b, 6). The portion of the specification referred to by Appellant explicitly refers to this figure as an 'in-wheel motor system' (see, for example, page 6, line 7). As such, the examiner understands that Appellant's constructive definition of 'in-wheel motor system' reasonably includes an arrangement where the motor is not within the wheel, although the 'system' may partially be so located.

As further regards the combination of Baker et al. with Iizuka et al., the reference to Baker et al. provides a steered wheel, which may be driven through a universal joint (26) and shaft (16) connected to a non-steered vehicle portion (e.g. axle portion 12), and analogously Iizuka et al. provides a steered wheel (23) also driven through a universal joint (coincidentally also 26) by a motor (21) connected to a non steered portion of the vehicle, and it would be deemed an obvious modification to provide the otherwise un-illustrated drive system taught by Baker et al., and already connected to a

non-steered vehicle portionm, as a motor as taught by Iizuka et al. to provide a motive power source for the well known purpose of providing the benefits of an electric drive, such as reducing or eliminating emissions.

As regards the provision of constant velocity joints between a drive shaft and the wheel, initially the examiner notes that a wheel which is pivotable in a steering direction being driven by a source which does not pivot would require a joint such as a constant velocity joint or a universal joint. Both Baker et al. and Iizuka et al. show such an element. Both references explicitly refer to this element as a universal joint (Baker et al, at col. 3, line 20; Iizuka et al. at col. 5, lines 1-2), which performs as a constant velocity joint for low angles of deflection between input and output elements. Appellant's assertion that Iizuka does not illustrate a motor (page 17 of the Brief) is noted, but is not at all persuasive in that the examiner has explicitly identified Iizuka et al.'s motor as element 21 (see Iizuka et al., at least at col. 4, line 57).

The examiner has asserted that one of ordinary skill in the art would be well aware of the interchangeability of universal joints and constant velocity joints. The constant velocity joint has the advantage of delivering a constant input-to-output speed, while a universal joint, at larger angles between input and output shafts, will deliver a periodic variation in output velocity due to the geometry of the parts (although obviously the average output velocity will be equal to the input velocity). As supplemental teachings, the examiner has cited a number of references which illustrate that one of ordinary skill would be aware of the interchangeability of universal and constant velocity joints, and that the use of a constant velocity joint is seen as desirable in conditions where a non-zero angle exists between a driven and driving shaft as would be applicable to a steered wheel environment:

Whalmark teaches a device which is characterized by the terms 'constant velocity' and 'universal joint' being used in conjunction (see col. 4, lines 30-45, "constant velocity universal joint"), which is understood to constitute at least an implicit suggestion that elements called universal joints may in fact be constant velocity joints, the reference further identifying advantages with the CV arrangement (col. 4, lines 34-40)

and explicitly identifies an automotive wheel drive venue as being a beneficial recipient of such an arrangement (col. 4, lines 44-45).

Miki et al. teach that a constant velocity joint is understood to be employed for the support of a front wheel drive arrangement (wherein it is known to provide a wheel which is both steered and driven) in an automobile (see col. 1, lines 7-12), wherein, again, the terms are used in conjunction (e.g., col. 3, line 10: "constant velocity universal joint"), which is understood to constitute at least an implicit suggestion that elements called universal joints may in fact be constant velocity joints.

Mazziotti, while not explicitly referring to use in an automobile, again teaches a beneficial 'constant velocity universal joint' which is alternatively referred to as solely a 'universal joint' (see, for example, col. 3, lines 10-15)

Kudo et al. teach that a constant velocity joint is understood to be employed for the support of a drive arrangement in an automobile (see col. 1, "Field of the Invention"), wherein, again, the terms are used in conjunction (e.g., col. 1, lines 51-55: "constant velocity universal joint"), and which arrangement is well understood to be beneficially employed under conditions where a drive and drive member are oriented at a non-zero angle with respect to one another.

As regards the alternatively presented rejections based on Baker et al. Iizuka et al. and Tenney, initially it appears as though Appellant is attacking the combination as being untenable because plural references are required to meet the claim (page 19 of the Brief). In this case, Appellant may desire to consider that rejections may be advanced under 35 USC §103, as they are herein, which allows the use of plural references to be applied against a claim. The examiner certainly agrees that the claims do not appear to be anticipated by a single prior art reference.

Appellant again asserts that the references fail to show a first non-pivoting knuckle and a second pivoting knuckle. The base reference to Baker et al. teaches this: the examiner has identified the first knuckle as being a portion which does not turn, and which, due to not turning, would reasonably be understood to not be steerable, as being

the non-pivoting portion of the mechanism proximate element 122. Baker et al. further provide a second knuckle element (19, 21, 82, 85) which supports a wheel hub (e.g., at 28, 34, 36, etc.), pivots about a king-pin axis (Y-Y), and is steerable with respect to the non-steered portions (col. 4, lines 26-32).

Appellant refers to an allegation that the 'knuckle elements may be divided', following with an assertion of impermissible hindsight having been employed. As noted above, Baker et al. already teach that the arrangement constitutes portions which pivot in steering and portions which do not. The portions which do not may be reasonably interpreted as being associated with the first knuckle, and those which do may be reasonably interpreted as being associated with the second knuckle.

As regards the further combination involving Tenney, the examiner notes that this reference teaches an analogous arrangement including a driven and steered wheel (43) with a steering rod (72) which is connected to an arm which is in turn connected to the pivoting portion of the wheel mount (and not to a portion of the wheel mount which cannot pivot in steering). Tenney is relied upon for an explicit formalization that it is well known to connect a steering rod to the pivoting portion of a wheel mount. Appellant's claim requires that the pivoting portion (i.e., the second knuckle) be "connected to a steering rod" (claim 1, line 5). Baker et al. already teaches a portion which supports the wheel and pivots about a king-pin axis, which constitutes the claimed second knuckle, and further teaches that the arrangement is associated with a steered wheel. The part that pivots does so in order to effect steering, and as such, in view of Tenney teaching that a steering rod should be connected to the pivoting part, it is deemed a reasonable modification to connect a steering rod to the pivoting part already taught by Baker et al. on a wheel arrangement which is already taught to be steerable in order to provide an actual means for providing the already-taught steering.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Frank B Vanaman/

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